

Session 5pSP

Speech Communication: Applications of Speech Perception Research in Disordered Populations

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Contributed Papers

1:00

5pSP1. Speech perception without audition. Lynne E. Bernstein (Ctr. for Auditory and Speech Sci., Gallaudet Univ., 800 Florida Ave., N.E., Washington, DC 20002) and Marilyn E. Demorest (Univ. of Maryland, Baltimore County, Baltimore, MD 21228)

Most knowledge about speech perception is within the framework of studies concerned with acoustic-phonetic stimulus attributes. Vision is known to affect speech perception but is typically considered only as a supplement to hearing. The literature contains assertions that only 30% of words are recognized in lipreading/speechreading and that hearing subjects are more accurate than deaf subjects. Observations of expert visual speech perception among some profoundly deaf subjects [L. E. Bernstein *et al.*, *J. Acoust. Soc. Am.* **90**, 2971-2984 (1991)] promoted questioning of the conventional wisdom. A normative study of lipreading was therefore conducted involving 96 hearing and 72 deaf young adults. The two populations differed significantly across nonsense syllable, word, and sentence identification measures. The most accurate subjects were from within the deaf population. Results that lipreading in some deaf subjects is comparable to listening to speech in noise by hearing subjects. Expert lipreading demonstrates that speech perception does not require audition. Speech perception appears to be fundamentally the perception of linguistic entities not acoustic-phonetic attributes. Theories of speech perception for which generality is claimed need either to account also for visual speech perception or need to limit their claims to generality.

1:15

5pSP2. Stimulus materials for audio-visual studies of attention and speech perception by the hearing impaired. Brad Rakerd (Dept. of Audiol. and Speech Sci., Michigan State Univ., East Lansing, MI 48824) and Philip F. Seitz (Gallaudet Univ., Washington, DC 20002)

Individuals with sensorineural hearing impairment have been shown to devote a larger than normal share of their attention to speech processing when listening in situations that afford access to audio speech cues only. Attentional commitments may prove to be more nearly normal if both audio and visual speech cues are available. To test this possibility, a studio-quality videotape has been developed for use in primary-task and dual-task studies of attention and speech perception. Markers on the tape make it possible to maintain coordination with a computer. The timing of speech events is specified to within a few milliseconds, potentiating subject reaction time measurements. There are three sets of stimulus materials: (i) 30 to 45s samples of connected discourse; (ii) triplets of phonetically balanced monosyllabic words, arranged in an ABX format for discrimination experiments; and (iii) randomized lists of words and phonetically matched nonwords for lexical decision experiments. Copies of the videotape, along with supporting software and other test materials, are available upon request. [Work supported by NIH-NIDCD.]

1:30

5pSP3. Evaluating the articulation index for auditory-visual consonant recognition. Ken W. Grant and Brian E. Walden (Walter Reed Army Med. Ctr., Army Audiol. and Speech Ctr., Washington, DC 20307-5001)

The ANSI standard for calculating the articulation index [ANSI S3.5-1969 (R1986)] includes a procedure for estimating the effects of visual cues on speech intelligibility. This procedure assumes that listening conditions with the same auditory articulation index (AI_A) will have the same auditory-visual AI (AI_{AV}) regardless of the spectral composition of the signal. In contrast, other studies have suggested that the redundancy between A and V speech cues might be a better predictor of AV performance than either the AI_A or the overall (e.g., percent correct) auditory recognition score. In the present study, the ANSI procedure is evaluated by measuring A, V, and AV consonant recognition under a variety of different signal-to-noise and bandpass-filtered speech conditions. The results indicate that auditory conditions having the same AI_A do not necessarily result in the same AI_{AV} , and that low-frequency bands of speech tend to provide more benefit to speechreading than high-frequency bands of speech. Analyses of the auditory error patterns produced by the different filter conditions showed a strong negative correlation between the degree of A and V redundancy and the AV benefit obtained. These data indicate that the ANSI procedure is inadequate for predicting AV consonant recognition performance under conditions of severe spectral shaping. [Work supported by NIH Grant No. DC00792.]

5pSP4. Abstract withdrawn.